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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/650,258	08/27/2003	Han-Ping Pu	6319-66761	7182
24197	7590	07/15/2004	EXAMINER	
KLARQUIST SPARKMAN, LLP 121 SW SALMON STREET SUITE 1600 PORTLAND, OR 97204			NGUYEN, DILINH P	
			ART UNIT	PAPER NUMBER
			2814	

DATE MAILED: 07/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/650,258	Applicant(s) PU, HAN-PING	
	Examiner DiLinh Nguyen	Art Unit 2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 26 April 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 12-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 12-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☒ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>2/10/04, 1/7/04</u> | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Regarding claims 18-19, the phrase "in case" renders the claim indefinite because it is unclear whether the limitation(s) are part of the claimed invention. See MPEP § 2173.05(d).

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 12-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA (fig. 1a) in view of Desai et al. (U.S. Pat. 6281581).

AAPA discloses a semiconductor device comprising:

a device carrier 101 including a metal surface 82;

at least a semiconductor unit 21; and

at least an interconnection portion 31 having one end on the metal surface

and another end on the semiconductor unit.

AAPA fails to disclose the interconnection portion including a first part; wherein the first part having a melting point lower than that of the second part and surrounding and adhering to the second part.

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Desai et al. disclose a semiconductor device (fig. 5A) comprising:

- a device carrier 604;
- at least a semiconductor unit 606 including at least an electrode 608; and
- at least an interconnection portion including a first part 614 and 612 and a second part 610, the first part having one end on the carrier surface and another end on the semiconductor unit, the second part having one end on the carrier surface and another end on the electrode of the semiconductor unit, the first part having a melting point lower than that of the second part (column 5, lines 58-63) and surrounding and adhering to the second part (fig. 5, column 5, lines 45 et seq.). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device structure of AAPA by having the first part with the structure as set forth above because as taught by Desai et al., such the first part would increase the reliability of the connection between an area array package and supporting substrate (fig. 5A, column 3, lines 15-18).

- Regarding claim 13, AAPA discloses that the interconnection portion mechanically connects the metal surface and the semiconductor unit (fig. 1a).
- Regarding claim 14, Desai et al. disclose that the interconnection portion mechanically connects the device carrier and the semiconductor unit (fig. 5).

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- Regarding claim 15, Desai et al. disclose that the first part contains more tin than lead, while the second part contains more lead than tin (column 6, lines 1-5).
- Regarding claim 16, AAPA discloses the device carrier is a lead frame 101 (fig. 1a, page 3, line 18).
- Regarding claim 17, AAPA discloses the device carrier is a lead frame including an inner lead 81 enclosed by the meal surface 82 (fig. 1a, page 3, line 18).
- Regarding claim 18, in so far as it is understood, Desai et al. disclose the second part contains materials (fig. 5A, column 6, lines 4-5) for controlling the solder wettability between the first part and the second part wherein the first part is in a fluid state (abstract).
- Regarding claim 19, Desai et al. disclose the first part contains materials (fig. 5A, column 6, line 3) for the solder wettability between the first part and the second part be controlled by the second part, wherein the first part is in a fluid state (abstract).

3. Claims 12 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Desai et al. (U.S. Pat. 6281581) in view of Grigg (U.S. Pat. 6506671)

Desai et al. disclose a semiconductor device (fig. 5A) comprising:

a device carrier 604;

at least a semiconductor unit 606 including at least an electrode 608; and

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at least an interconnection portion including a first part 614 and 612 and a second part 610, the first part having one end on the carrier surface and another end on the semiconductor unit, the second part having one end on the carrier surface and another end on the electrode of the semiconductor unit, the first part having a melting point lower than that of the second part (column 5, lines 58-63) and surrounding and adhering to the second part (fig. 5, column 5, lines 45 et seq.).

Desai et al. fail to disclose the device carrier including a metal surface and another end of the first part partially contacts an area which is part of the semiconductor unit and which surrounds the electrode of the semiconductor unit.

Gigg discloses a semiconductor device comprising:

a device carrier 30 including a metal surface; and

at least an interconnection portion including a first part 50' and second part 20', wherein another end of the first part 50' partially contacts the electrode of the semiconductor unit 10 and partially contacts an area which is part of the semiconductor unit and which surrounds the electrode of the semiconductor unit (cover fig., column 6, lines 19-25). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device structure of Desai et al. by having the first part partially contacts an area which is part of the semiconductor unit with the structure as set forth above because as taught by Gigg, such the contact area would preventing contamination of the passivation layer surrounding the contact pads and reduce the occurrence of solder fatigue (cover fig., column 4, lines 10-20).

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**Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DiLinh Nguyen whose telephone number is (571) 272-1712. The examiner can normally be reached on 8:00AM - 6:00PM (M-F).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DLN

  
HOAI PHAM